FINAL
FIELD SAMPLING PLAN FOR STORM WATER

OF THE
CAMP EDWARDS IMPACT AREA GROUNDWATER QUALITY STUDY

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

Prepared for

NATIONAL GUARD BUREAU
ARLINGTON, VIRGINIA

Prepared by

OGDEN ENVIRONMENTAL AND ENERGY SERVICES
239 Littleton Road, Suite 1B
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DISCLAIMER:

This document has been prepared pursuant to a government administrative order (U.S. EPA Region I SDWA Docket No. I-97-1019) and is subject to approval by the U.S. Environmental Protection Agency. The opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the Environmental Protection Agency.

A.16 Storm Water Field Sampling Plan

A.16.1 Introduction

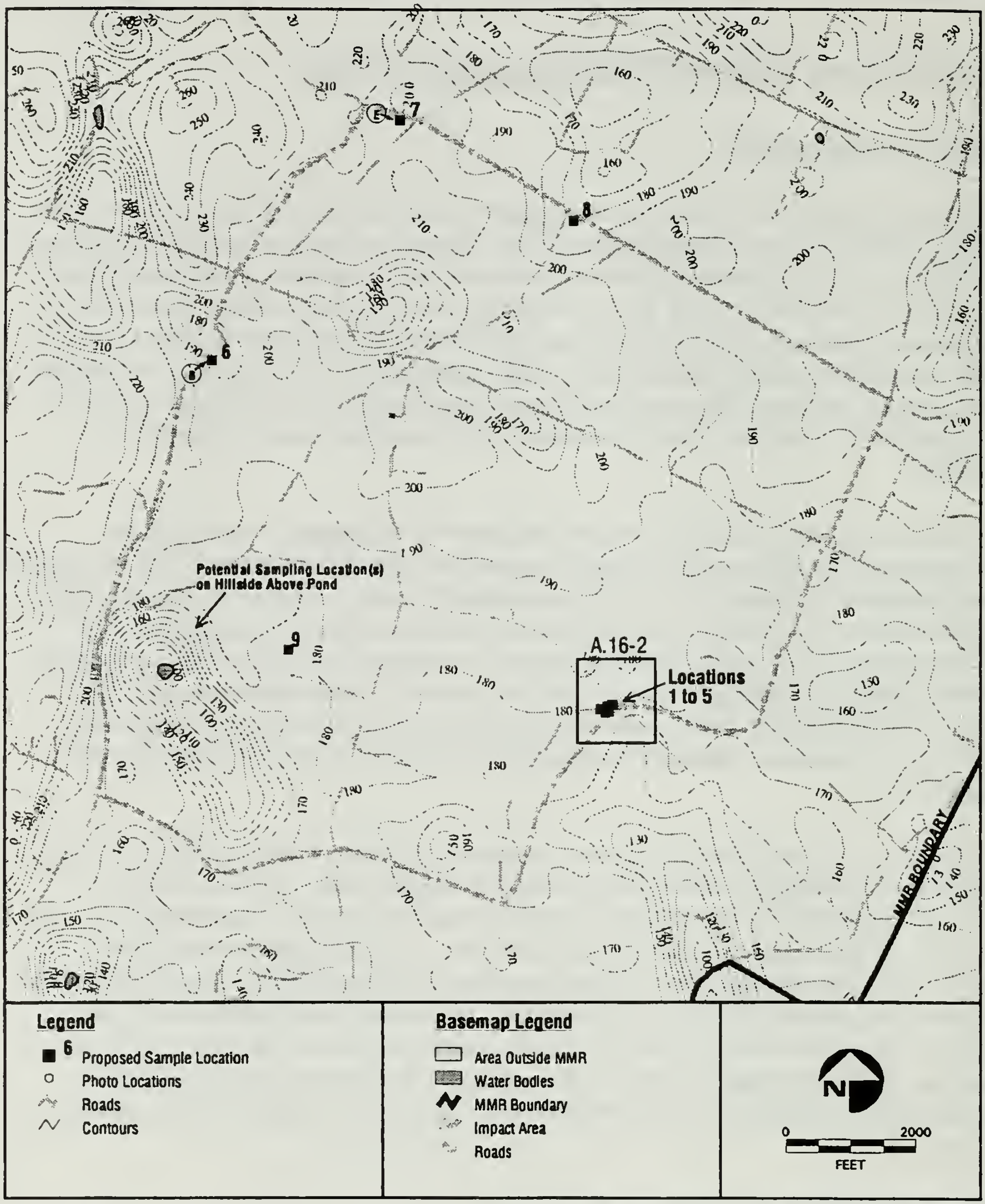
The primary purpose of the storm water sampling is to characterize storm water runoff for the potential to carry contaminants off site. Therefore, storm water runoff that leaves the Impact Area is the primary concern. However, the topography around the perimeter of the Impact Area is relatively flat. Roadsides are well vegetated and in general the topography slopes toward the Impact Area rather than away from the Impact Area. As a result, appropriate sample locations around the perimeter of the Impact Area are limited. The high permeability of the sands and gravel underlying the training range and Impact Area are further expected to limit the quantity of storm water runoff available for sampling.

Locations have been identified along the perimeter of the Impact Area where the topography and visible erosion channels suggest that runoff flow is away from the Impact Area, as shown in Figure A.16-1. The most suitable locations appear to be located near the intersection of Chadwick Road and Indian Trail Road, as shown in Figure A.16-2. These locations are at visible erosion channels, as indicated in the attached photographs. Several potential sampling locations were also observed around the north and west perimeter of the Impact Area, as shown in Figure A.16-1. No erosion channels were observed in these areas, although it appears that surface flow may be away from the Impact Area.

A secondary purpose of the storm water sampling is to evaluate the potential for storm water runoff to mobilize contaminants within the Impact Area. There are several localized depressions in the Impact Area where runoff may collect and infiltrate into the soil. One of the largest of these is Succonsette Pond, at which surface water and sediment samples are being collected as described in a separate FSP. Surface water and sediment samples are also being collected from numerous water bodies outside the Impact Area, as described in that FSP. Storm water samples will be collected at several locations within the Impact Area east of Succonsette Pond, near where detectable concentrations of explosives have been found in surface soil. These locations are shown in Figure A.16-1.

A.16.2 Sampling & Analysis Methods

Each of the sampling locations shown in Figures A.16-1 and A.16-2 will be inspected and



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Storm Water Sampling Locations

FIGURE A.16-1

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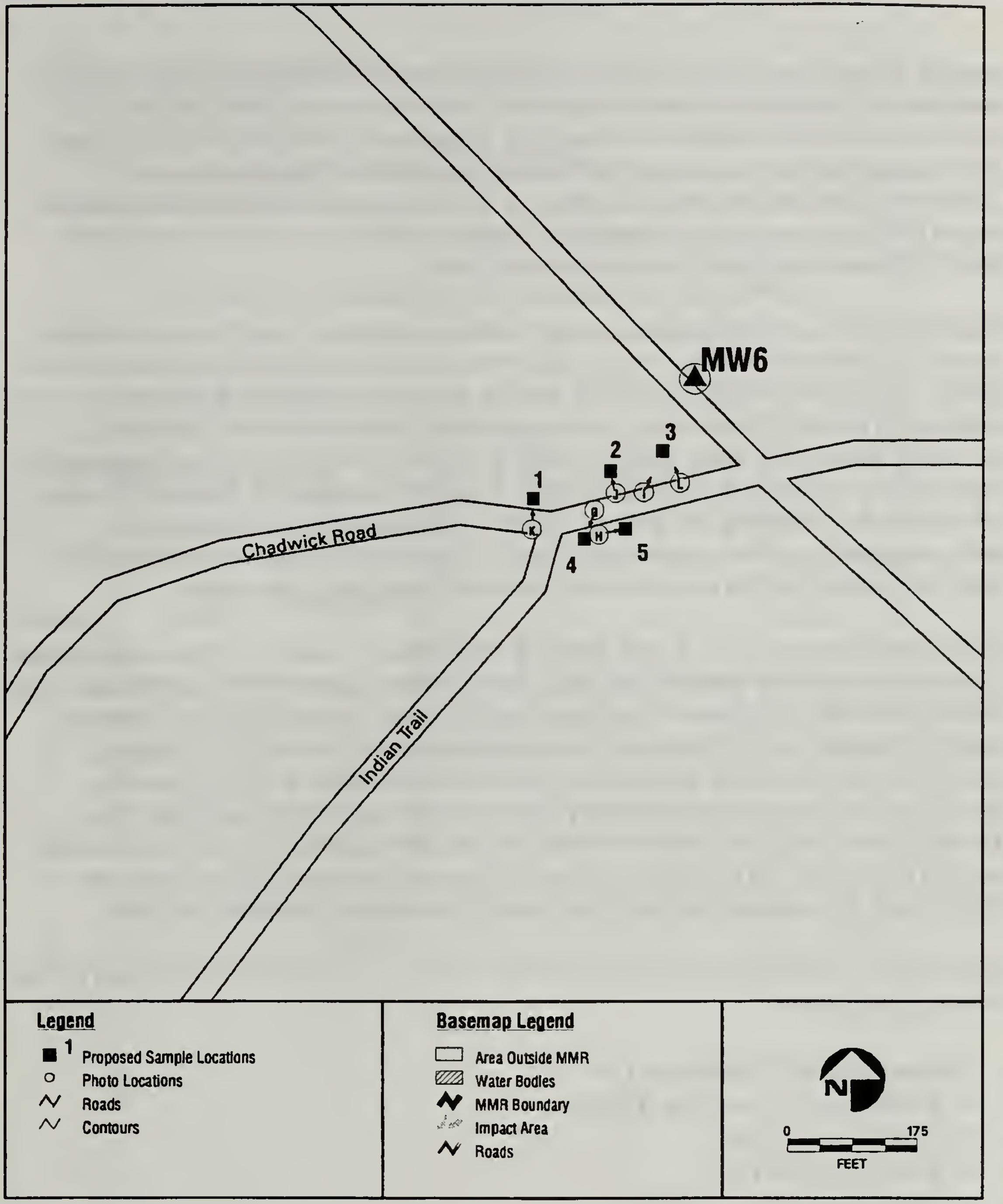

FIGURE

A.16-2

Proposed Sampling Locations at Indian Trail/Chadwick Road

/net/palea/oahu/mmrdata/mmr/spatial/ogden/plots/figures/figa16-2.aml

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sampled during storm events, if there is sufficient storm water flow for filling sample containers. All sample locations are subject to UXO clearance in order to allow foot traffic and shallow excavations for sampling. Locations 1-5 and 7 have already been UXO cleared and have been excavated to allow placement of sample containers. Locations 6, 8, 9, and any future locations on the hillside east of Succonsette Pond will require UXO clearance prior to sampling. Sample collection will be consistent with MMR SOPs and the Ogden Health and Safety Plan.

Field team members will prepare a sample collection container at each sample location by placing a stainless steel bucket in a shallow excavation in the path of the storm water runoff. A cover will be placed over the bowl to protect the container from direct collection of rainfall. Storm water grab samples will be collected within the first 30 minutes of runoff from major storm events (>1 inch in 24 hours). Potential major storm events will be identified by monitoring daily forecasts from the U.S. National Weather Service (contact Southern NE Forecast Center in Taunton MA, or by Internet at www.nws.noaa.gov/er/box/maps/ maps.html). When a major storm event is forecast, collection buckets will be put in place or emptied if previously put in place.

VOC sample vials will be collected first and filled directly from the effluent water stream if possible or otherwise from the collection bowl. The method of VOC vial filling will be documented in the field notes for reference during report preparation. The remaining sample containers will be filled from the sample collection bucket by submerging, pouring from the bucket, or transferring with a decontaminated scoop or container. Samples will be preserved and analyses placed on hold until Ogden confirms with MAANG meteorological personnel that the measured amount of precipitation is at least one inch in 24 hours. If precipitation does not exceed this amount, NGB, EPA, and MADEP will be contacted to determine whether the samples should be analyzed.

Samples will be collected as indicated in Table A.16-1. Samples will be analyzed for the following compounds:

- Explosives by EPA Method 8330
- CLP Metals and cyanide by ILM04.0
- CLP VOC by OLC02.1
- CLP SVOC by OLC02.1
- CLP Pesticide/PCB by OLC02.1
- Herbicide by EPA Method 8151
- EDB by Method 504.1

- MTBE by EPA Method 8021
- TOC by Method 415.1
- Anions by Method 300.0
- NO2/NO3, NH4, P by Methods 350.2, 365.2, 353.2
- Hardness by Method 130.1

Table A.16-1. Samples to be Collected for Storm Water

MMR Storm Water Samples			Parameters:	Explosives (EPA 8330)	Inorganics:	Cyanide	TOC	Cl, SO4, Alk.	NO2/NO3, NH4, Phos.	Metals/ Hardness	Other Analytes:	VOC	SVOC	PCB/Pest.	Herbicide	EDB	MTBE
Location	MMR ID	EPA/Ogden ID	Bottles	2*1LA		1LP	2*40mL	1LA	1LP	1LP		3*40mL	2*1LA	2*1LA	2*1LA	3*40mL	3*40mL
			Pres.	none		NaOH	H2SO4	none	H2SO4	HNO3		HCl	none	none	none	ThioS	HCl
1	71ST001XXX01XA	T001XA		X		X	X	X	X	X		X	X	X	X	X	X
2	71ST002XXX01XA	T002XA		X		X	X	X	X	X		X	X	X	X	X	X
3	71ST003XXX01XA	T003XA		X		X	X	X	X	X		X	X	X	X	X	X
4	71ST004XXX01XA	T004XA		X		X	X	X	X	X		X	X	X	X	X	X
5	71ST005XXX01XA	T005XA		X		X	X	X	X	X		X	X	X	X	X	X
6	71ST006XXX01XA	T006XA		X		X	X	X	X	X		X	X	X	X	X	X
7	71ST007XXX01XA	T007XA		X		X	X	X	X	X		X	X	X	X	X	X
8	71ST008XXX01XA	T008XA		X		X	X	X	X	X		X	X	X	X	X	X
9	71ST009XXX01XA	T009XA		X		X	X	X	X	X		X	X	X	X	X	X

Photograph B: View north toward location 6 (1.4 miles north of Wheelock and Pocasset Sandwich Road).

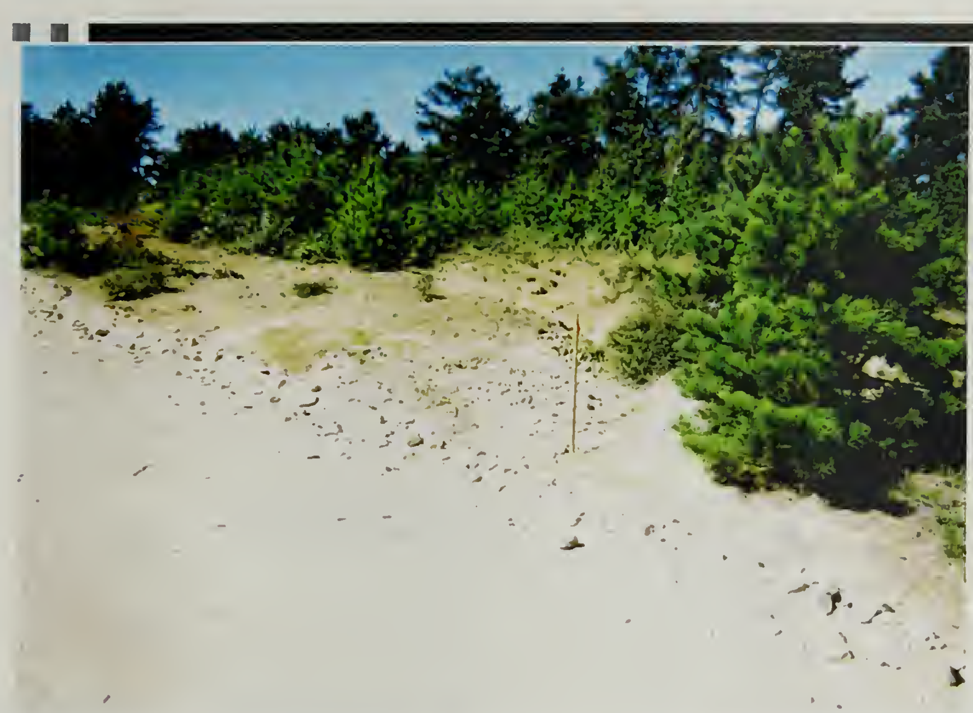
Photograph E: View southeast toward location 7 (0.1 miles south of Pocasset Sandwich and Jefferson Road).

Photograph G: View south toward location 4.

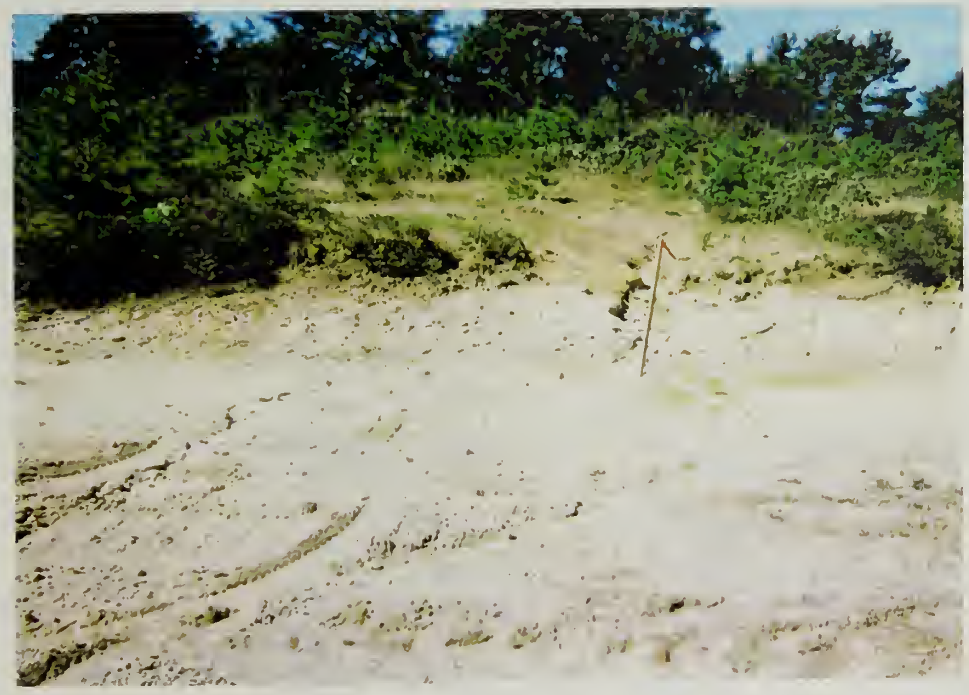
Photograph H: View northeast toward location 5

Photograph I: View northeast toward location 3.

Photograph J: View north toward location 2.



Photograph K: View north toward location 1.



Photograph L: View north toward location 3.

ATTACHMENT A: FIELD GUIDE TO HIGH EXPLOSIVES

Any substance encountered during sampling activities which differs in any way from natural media will be treated as a dangerous substance, carefully removed from the sample, and set aside.

EXPLOSIVES

NAME	DESCRIPTION	REMARKS
BLACK POWDER	BROWN TO BLACK	MANUFACTURED IN GRAINS THAT RANGE IN SIZE FROM SMALLER THAN SALT GRAINS TO GRAINS AS LARGE AS SMALL PEBBLES. HIGHLY SENSITIVE TO IGNITION BY HEAT, FRICTION, FLAME, SPARK. WHEN WET, IT IS CORROSIVE TO MOST METALS.
TNT	LIGHT YELLOW TO BROWN OR GRAY	LIGHTLY CORROSIVE WITH LEAD. USED IN BOMBS, GRENADES, DEMOLITION CHARGES, PROJECTILES. EXUDES AT ELEVATED TEMPERATURES. MODERATELY TOXIC BY SKIN ABSORPTION OR INHALATION.
EXPLOSIVE D	BRIGHT YELLOW TO ORANGE. ALSO CALLED AMMONIUM PICRATE.	RELATIVELY INSENSITIVE. HIGHLY TOXIC BY INHALATION, INGESTION, OR SKIN ABSORPTION
AMATOL	LIGHT BROWN TO YELLOW/MIXTURE OF TNT AND EXPLOSIVE D	SLIGHT HYGROSCOPIC. HAS CORROSIVE EFFECTS ON COPPER, BRONZE, LEAD, BRASS. HIGHLY TOXIC BY INHALATION, SKIN CONTACT, INGESTION.
COMPOSITION B	WHITE TO BROWNISH YELLOW, MIXTURE OF TNT AND EXPLOSIVE D	SLIGHTLY CORRODES COPPER, BRASS, CADMIUM, ZINC. USED IN BOMBS, PROJECTILES, GRENADES, SHAPED CHARGES.
OCTOL	LIGHT BROWN	USED IN BOMBS, PROJECTILES, SHAPED CHARGES.
RDX	WHITE. ALSO CALLED CYCLONITE	SENSITIVE TO IMPACT AND FRICTION.SLIGHTLY CORROSIVE WITH COPPER, BRASS, MILD STEEL, CADMIUM. MODERATELY TOXIC BY INHALATION OR INGESTION.
HMX	WHITE. ALSO CALLED OCTOGEN	SENSITIVE TO IMPACT AND FRICTION. SLIGHTLY TOXIC.
PETN	WHITE	SENSITIVE TO IMPACT. SLIGHTLY CORROSIVE TO BRASS, CADMIUM, ZINC. VERY SLIGHTLY TOXIC.

EXPLOSIVES, continued

NAME	DESCRIPTION	REMARKS
LEAD AZIDE	WHITE TO LIGHT BROWN	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO COPPER, ZINC. VERY SLIGHTLY TOXIC.
LEAD STYPHNATE	LIGHT ORANGE TO REDDISH BROWN	SAME AS LEAD AZIDE.
MERCURY FULMINATE	GRAYISH	VERY SENSITIVE TO IMPACT, FRICTION, SPARKS. CORROSIVE TO ALUMINUM, MAGNESIUM, BRONZE, COPPER, ZINC, BRASS. HIGHLY TOXIC THROUGH SKIN ABSORPTION, INHALATION, INGESTION. SYMPTOMS RESEMBLE MERCURY POISONING.

PYROTECHNIC AGENTS USED AT MMR

SYMBOL	COMMON NAME	VISUAL IDENTIFICATION	ACTION
CS	NONE	WHITE CRYSTALLINE SOLID	TEAR AGENT
HC	HEXACHORO-ETHANE	WHITE SOLID	SCREENING SMOKE
WP	WHITE PHOSPHOROUS	PALE YELLOW SOLID	SCREEN SMOKE AND INCENDIARY
RP	RED PHOSPHOROUS	REDDISH BROWN POWDER	SCREENING SMOKE

OTHER COMPOUNDS

NAME	PROPERTIES	STABILITY
Picric Acid	lemon-yellow crystalline solid	very sensitive to blows or friction
Tetryl	fine yellow crystalline powder	sensitive to blows or friction
Composition A	unknown	unknown
Composition C3	unknown	unknown
Composition C4	unknown	unknown
Pentolite (50/50)	unknown	unknown
Tracer Compound	unknown	unknown
PBX	unknown	unknown
Ednatol	unknown	unknown
Tetrytol	unknown	unknown

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